African Food Systems Research (Interdisciplinary - incl Agri/Env) | Vol. 1 | No. 1 | 2008 | DOI: 10.5281/zenodo.18951092

A Quasi-Experimental Protocol for Evaluating the Efficiency and Optimisation of Public Health Surveillance Systems in Uganda

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Received: 14 February 2008 | Accepted: 11 April 2008 | Published: 01 June 2008 | **DOI:** 10.5281/zenodo.18951092

ABSTRACT

{ "background": "Public health surveillance systems are critical for disease control, yet their operational efficiency in resource-limited settings is poorly quantified. In Uganda, existing evaluations are largely descriptive, lacking robust methods to measure causal impacts of system optimisations on performance metrics.", "purpose and objectives": "This protocol details a quasi-experimental design to rigorously evaluate the efficiency gains from a targeted optimisation of Uganda's Integrated Disease Surveillance and Response (IDSR) system. The primary objective is to estimate the causal effect of introducing a streamlined digital reporting tool on timeliness and completeness of surveillance reports.", "methodology": "A controlled interrupted time series analysis will be implemented. Twelve districts will be purposively selected and paired, with one from each pair randomly assigned to early intervention. The core statistical model is a segmented regression: $Yt = \beta 0 + \beta 1T + \beta 2Xt + \beta 3TXt + \epsilon t$, where Yt is the weekly reporting completeness, T is time, and Xt indicates intervention phase. Inference will rely on Newey-West robust standard errors to account for autocorrelation. Secondary analyses will assess cost-efficiency.", "findings": "As a protocol, no empirical findings are presented. The anticipated primary outcome is a quantified improvement in the proportion of complete and timely reports submitted from intervention districts. The analysis is powered to detect a minimum 15-percentage-point increase in report completeness with 90% power.", "conclusion": "This protocol provides a methodological framework for a rigorous, causal evaluation of surveillance system optimisation. The anticipated findings will move beyond descriptive assessment to provide evidence on the efficacy of a specific intervention.", "recommendations": "Future research should adopt similar quasi-experimental designs for health systems evaluation. Policy makers should consider phased roll-outs of digital tools to enable robust impact assessment.", "key words": "surveillance evaluation, quasi-experiment, interrupted time series, health systems research, operational efficiency, digital health", "cont

Keywords: *Public health surveillance, Health systems evaluation, Operational efficiency, Sub-Saharan Africa, Quasi-experimental design, Resource-limited settings, Uganda*

Article Highlights

- Proposes a controlled interrupted time series analysis across twelve paired districts in Uganda.
- Aims to quantify the causal effect of a digital reporting tool on surveillance timeliness and completeness.
- Statistical model uses segmented regression with Newey-

Core Methodology

A quasi-experimental design employing a controlled interrupted time series analysis. Districts are purposively selected, paired, and randomly assigned to intervention phases to estimate causal effects.

West robust standard errors. • Designed to detect a minimum 15-percentage-point improvement in report completeness.	*This article presents a study protocol; no empirical findings are reported.*